Lead Ammunition Use and Post-Shooting Hygiene Practices Among US Firearm Owners

Christian Hoover, MPH[1, 2], David Hemenway, PhD[1]

1 [illegible] an

2 B [illegible] USA

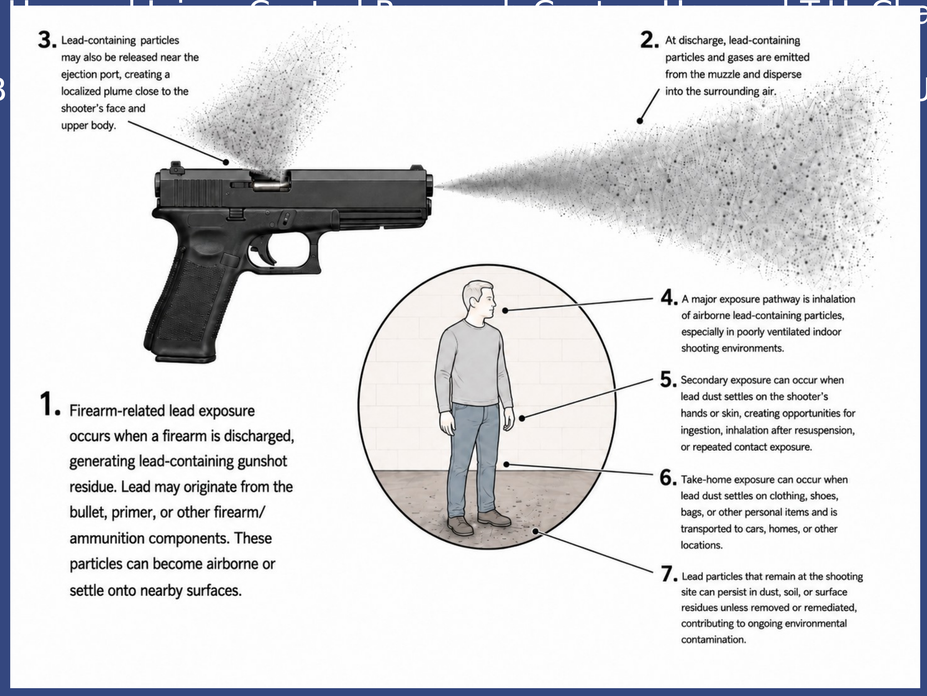
Introduction:

When firearms discharge, lead is aerosolized. Take-home lead exposure occurs from secondary and tertiary exposures via airborne firearm dust settling on clothes and personal effects in the shooting vicinity. Post-shooting hygiene behaviors can reduce some contamination. Firearms have been ecologically associated with elevated pediatric blood lead levels (>50mg/L) at the US city, town, state, and national level. Firearm use is strongly associated with increased blood lead concentrations among shooters. Few studies quantify the prevalence of firearm use and none estimate prevalence of lead-based ammunition use or post-shooting hygiene related behaviors among all US shooters. We fill this gap.

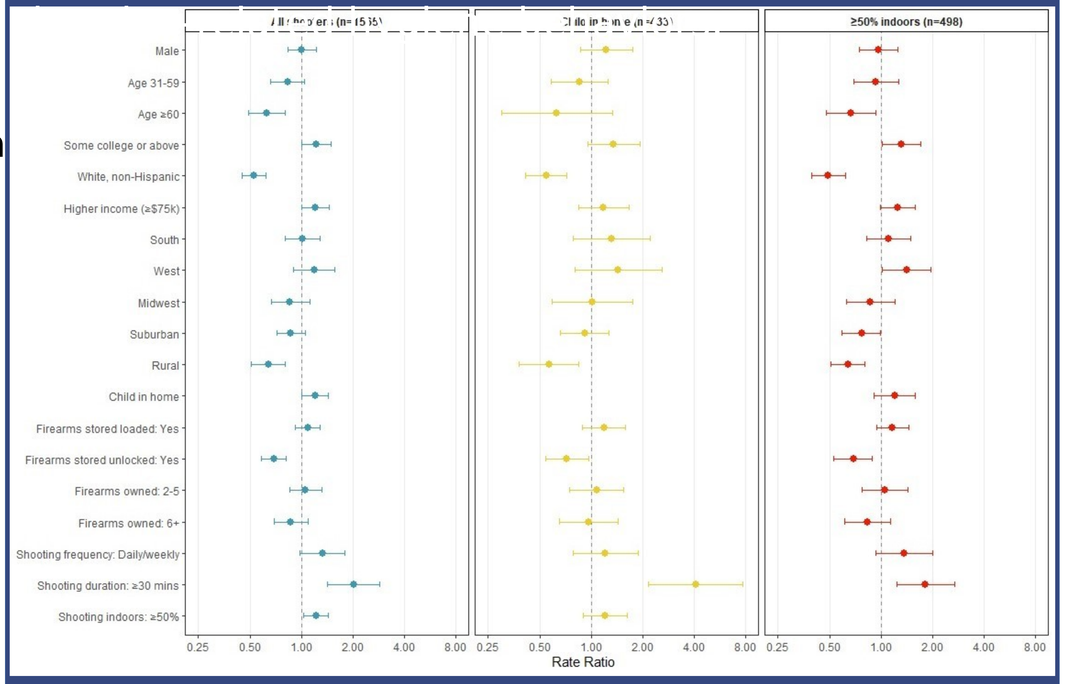
Methods:

Cross-sectional analysis of the National Firearms Survey, a nationally representative survey conducted in December 2024. Includes adults aged 18 or older who owned a firearm, reported firing a firearm in the past year, and used lead-based ammunition (or were unsure of type) (n=1,565). Participants reported demographic/geographic characteristics and firearm behaviors. Outcomes were self-reported post-shooting hygiene behaviors:

1. **Showering after shooting**
2. **Clean clothes before entering home**
3. **Change clothes**
4. **Change shoes**
5. **Clean personal effects**
6. **Store or isolate gear**


3. Lead-containing particles may also be released near the ejection port, creating a localized plume close to the shooter's face and upper body.
2. At discharge, lead-containing particles and gases are emitted from the muzzle and disperse into the surrounding air.
4. A major exposure pathway is inhalation of airborne lead-containing particles, especially in poorly ventilated indoor shooting environments.
5. Secondary exposure can occur when lead dust settles on the shooter's hands or skin, creating opportunities for ingestion, inhalation after resuspension, or repeated contact exposure.
6. Take-home exposure can occur when lead dust settles on clothing, shoes, bags, or other personal items and is transported to cars, homes, or other locations.
7. Lead particles that remain at the shooting site can persist in dust, soil, or surface residues unless removed or remediated, contributing to ongoing environmental contamination.
1. Firearm-related lead exposure occurs when a firearm is discharged, generating lead-containing gunshot residue. Lead may originate from the bullet, primer, or other firearm/ ammunition components. These particles can become airborne or settle onto nearby surfaces.

Forest plot of unadjusted weighted rate ratios (RR) examining the association between demographic characteristics and total number (95% CI) of



Contact:

Results:

Among US firearm owners who shot in the past year (75% male, 57% aged 31-59), **97% reported using lead-based ammunition or were unsure of type.** Most reported shooting monthly or less (94%) but for ≥30 minutes (91%); 32% primarily shot indoors. Overall, **46%** (95% CI:43%–49%) **engaged in no post-shooting hygiene behaviors and 30% (95%** CI:27%-33%) **engaged in only one.** Hygiene behaviors were higher among non-White, younger, urban-dwelling individuals with higher education and higher income, who shot more frequently and for longer durations. Approximately 6 million US children

Discussion:

Lead-based ammunition use is widespread among US shooters while post-shooting hygiene behaviors are uncommon and may be a substantial pathway for residential lead exposure. Firearm-related lead exposure may represent a preventable pathway for household lead exposure and warrants integration into lead prevention efforts. While the US is a global outlier in firearm ownership, firearm lead exposure occurs anywhere where lead bullets are shot. And there are no global standards for post-shooting

Lead-based ammunition use is widespread among US shooters, with very low post-shooting hygiene behaviors.